Complete Summary

GUIDELINE TITLE

Oxygen therapy for adults in the acute care facility: 2002 revision and update.

BIBLIOGRAPHIC SOURCE(S)

Kallstrom TJ. AARC Clinical Practice Guideline: oxygen therapy for adults in the acute care facility--2002 revision & update. Respir Care 2002 Jun;47(6):717-20. [33 references] PubMed

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Hypoxemia, severe trauma, acute myocardial infarction, conditions created by short-term therapy or surgical intervention (e.g., post-anesthesia recovery, hip surgery)

GUIDELINE CATEGORY

Evaluation
Treatment

CLINICAL SPECIALTY

Anesthesiology
Critical Care
Emergency Medicine
Geriatrics
Internal Medicine
Pulmonary Medicine

INTENDED USERS

Respiratory Care Practitioners

GUIDELINE OBJECTIVE(S)

To provide clinical practice guidelines on oxygen therapy for adults in the acute care facility

TARGET POPULATION

Adults in acute care facilities where oxygen therapy is indicated (See "Major Recommendations")

INTERVENTIONS AND PRACTICES CONSIDERED

Administration of oxygen therapy for adults in the acute care facility other than with mechanical ventilators and hyperbaric chambers

MAJOR OUTCOMES CONSIDERED

Patient response to therapy

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Procedure:

The procedure addressed is the administration of oxygen therapy for adults in the acute care facility other than with mechanical ventilators and hyperbaric chambers.

Definition/Description:

Oxygen therapy is the administration of oxygen at concentrations greater than that in ambient air with the intent of treating or preventing the symptoms and manifestations of hypoxia.

Setting:

This guideline is confined to oxygen administration in the acute care facility.

Indications

- Documented hypoxemia: Defined as a decreased arterial oxygen tension (P_{aO2}) in the blood below normal range. P_{aO2} of <60 torr or arterial oxygen saturation (S_{aO2}) of <90% in subjects breathing room air or with P_{aO2} and/or S_{aO2} below desirable range for specific clinical situation.

- An acute care situation in which hypoxemia is suspected; substantiation of hypoxemia is required within an appropriate period of time following the initiation of therapy
- Severe trauma
- Acute myocardial infarction
- Short-term therapy or surgical intervention (e.g., post-anesthesia recovery, hip surgery)

Limitations of Procedure:

Oxygen therapy has only limited benefit for the treatment of hypoxia due to anemia, and benefit may be limited with circulatory disturbances. Oxygen therapy should not be used in lieu of but in addition to mechanical ventilation when ventilatory support is indicated.

Assessment of Need:

Need is determined by measurement of inadequate oxygen tensions and/or saturations, by invasive or noninvasive methods, and/or the presence of clinical indicators as previously described.

Assessment of Outcome:

Outcome is determined by clinical and physiologic assessment to establish the adequacy of patient response to therapy.

Resources:

- Equipment
    1. Low-flow systems deliver 100% (i.e., fractional concentration of delivered oxygen [F_{DO2}] = 1.0) oxygen at flows that are less than the patient's inspiratory flowrate (i.e., the delivered oxygen is diluted with room air) and thus, the oxygen concentration inhaled (F_{IO2}) may be low or high, depending on the specific device and the patient's inspiratory flowrate.
        a. Nasal cannulae can provide 24% to 40% oxygen with flowrates up to 6 L/min in adults (depending on ventilatory pattern). Oxygen supplied via nasal cannula at flowrates $\leq$4 L/min need not be humidified. Care must be taken when assigning an estimated F_{IO2} to patients as this low-flow system can have great fluctuations.
        b. Simple oxygen masks can provide 35% to 50% F_{IO2}, depending on fit, at flowrates from 5 L/min to 10 L/min. Flowrates should be maintained at 5 L/min or more in order to avoid rebreathing exhaled carbon dioxide (CO_2) that can be retained in the mask. Caution should be taken when using a simple mask where accurate delivery of low concentrations of oxygen is required. Long-term use of simple mask can lead to skin irritation and pressure sores.
        c. Partial rebreathing mask is a simple mask with a reservoir bag. Oxygen flow should always be supplied to maintain the reservoir bag at least one third to one half full on inspiration. At

a flow of 6 L/min to 10 L/min the system can provide 40% to 70% oxygen. It is considered a low-flow system. The non-rebreathing mask is similar to the partial rebreathing mask except it has a series of one-way valves. One valve is placed between the bag and the mask to prevent exhaled air from returning to the bag. There should be a minimum flow of 10 L/min. The delivered F_{IO2} of this system is 60% to 80%.

d. Patients who have been receiving transtracheal oxygen at home may continue to receive oxygen by this method in the acute care facility setting provided no problems present. If difficulties related to the transtracheal route of administration appear, oxygenation should be assured by other means.

2. High-flow systems deliver a prescribed gas mixture: either high or low F_{DO2} at flowrates that exceed patient demand.
   a. Currently available air-entrainment masks can accurately deliver predetermined oxygen concentration to the trachea up to 40%. Jet-mixing masks rated at 35% or higher usually do not deliver flowrates adequate to meet the inspiratory flowrates of adults in respiratory distress.
   b. Aerosol masks, tracheostomy collars, T-tube adapters, and face tents can be used with high-flow supplemental oxygen systems. A continuous aerosol generator or large-volume reservoir humidifier can humidify the gas flow. Some aerosol generators cannot provide adequate flows at high oxygen concentrations.

- Personnel
  1. Level I personnel: i.e., any person who has adequately demonstrated the ability to perform the task; may check and document that a device is being used appropriately and the flow is as prescribed.
  2. Level II personnel: licensed or credentialed respiratory care practitioners or persons with equivalent training and documented ability to perform the tasks; may assess patients, initiate and monitor oxygen delivery systems, and recommend changes in therapy.

Monitoring:

- Patient
  1. Clinical assessment including but not limited to cardiac, pulmonary, and neurologic status.
  2. Assessment of physiologic parameters: measurement of P_{aO2} or saturation in any patient treated with oxygen. An appropriate oxygen therapy utilization protocol is suggested as a method to decrease waste and to realize increased cost savings. Consider need/indication to adjust F_{DO2} for increased levels of activity and exercise.
     a. in conjunction with the initiation of therapy
     b. within 12 hours of initiation with $F_{IO2} < 0.40$
     c. within 8 hours, with $F_{IO2} \geq 0.40$ (including postanesthesia recovery)
     d. within 72 hours in acute myocardial infarction
     e. within 2 hours for any patient with the principal diagnosis of chronic obstructive pulmonary disease (COPD)
- Equipment
  1. All oxygen delivery systems should be checked at least once per day.

2. More frequent checks by calibrated analyzer are necessary in systems:
    a. susceptible to variation in oxygen concentration (e.g., high-flow blending systems)
    b. applied to patients with artificial airways
    c. delivering a heated gas mixture
    d. applied to patients who are clinically unstable or who require an F_{IO2} of 0.50 or higher
3. Care should be taken to avoid interruption of oxygen therapy in situations including ambulation or transport for procedures.

Frequency:

Oxygen therapy should be administered continuously unless the need has been shown to be associated only with specific situations (e.g., exercise and sleep).

Infection Control:

Under normal circumstances, low-flow oxygen systems (including cannulae and simple masks) do not present clinically important risk of infection and need not be routinely replaced. High-flow systems that employ heated humidifiers and aerosol generators, particularly when applied to patients with artificial airways, can pose important risk of infection. In the absence of definitive studies to support change-out intervals, results of institution-specific and patient-specific surveillance measures should dictate the frequency with which such equipment is replaced.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for each recommendation.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate administration of oxygen therapy to adults in the acute care facility

POTENTIAL HARMS

Precautions and/or Possible Complications:

- With arterial oxygen tension (P_{aO2}) $\geq$60 torr, ventilatory depression may occur in spontaneously breathing patients with elevated P_{aO2}.
- With oxygen concentration inhaled (F_{IO2}) $\geq$0.5, absorption atelectasis, oxygen toxicity, and/or depression of ciliary and/or leukocytic function may occur.

- Supplemental oxygen should be administered with caution to patients suffering from paraquat poisoning and to patients receiving bleomycin.
- During laser bronchoscopy, minimal levels of supplemental oxygen should be used to avoid intratracheal ignition.
- Fire hazard is increased in the presence of increased oxygen concentrations.
- Bacterial contamination associated with certain nebulization and humidification systems is a possible hazard.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Kallstrom TJ. AARC Clinical Practice Guideline: oxygen therapy for adults in the acute care facility--2002 revision & update. Respir Care 2002 Jun;47(6):717-20. [33 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1991 (revised 2002 Jun)

GUIDELINE DEVELOPER(S)

American Association for Respiratory Care - Professional Association

SOURCE(S) OF FUNDING

American Association for Respiratory Care (AARC)

GUIDELINE COMMITTEE

2002 Clinical Practice Guideline Steering Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Revised by Thomas J. Kallstrom, RRT, FAARC

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This updates a previously released version (Respir Care 1991 Dec;36[12]:1410-3).

GUIDELINE AVAILABILITY

Electronic copies: Available from the American Association for Respiratory Care (AARC) Web site.

Print copies: Available from American Association for Respiratory Care, 11030 Ables Lane, Dallas, TX 75229.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- The AARC Clinical Practice Guidelines. Respir Care 1996;41(7):647-53.

Print copies: Available from the American Association for Respiratory Care (AARC), CPG Desk, 11030 Ables Ln, Dallas, TX 75229-4593; Web site: www.aarc.org.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on November 30, 1998. The information was verified by the guideline developer on December 15, 1998. This summary was updated by ECRI on May 29, 2002. The updated information was verified by the guideline developer on July 23, 2002.

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